An ArcView Extension for Delineating and Classifying Features in Georeferenced Imagery

NOAA Mapping Tools for Coastal Resource Assessment

This document describes a computer mapping tool that can be used to delineate and classify habitat features on georeferenced imagery. The Habitat Digitizing Extension is an extension to ArcView that allows a user to define a hierarchical classification scheme and attribute polygons using menus and dialog boxes.

Background

The Habitat Digitizing Extension was originally created to help in the classification of benthic habitats from imagery of the nearshore areas around the Virgin Islands. A classification scheme was hard-coded into the extension, but as the scope of the project expanded, different classification schemes were needed for other sites. Instead of having several different extensions, each with its own hard-coded scheme, a new version of the extension was created to allow a user to create custom classification schemes for different applications.

Hierarchical Classification Schemes

The initial step in preparing to use the extension is to set up a hierarchical classification scheme. An example of such a scheme, a portion of the one used for the initial benthic classification project, follows:

Coral Reef and Colonized Hardbottom
- Colonized Bedrock
- Colonized Pavement
- Colonized Pavement with Sand Channels
- Linear Reef
- Patch Reef (Aggregated)
- Patch Reef (Individual)
- Scattered Coral/Rock
- Spur and Groove Reef

Submerged Vegetation
- Macroalgae
  - Continuous
  - Patchy
    - 10%-50%
    - 50%-90%
- Seagrass
  - Continuous
  - Patchy
    - 10%-30%
    - 30%-50%
    - 50%-70%
    - 70%-90%

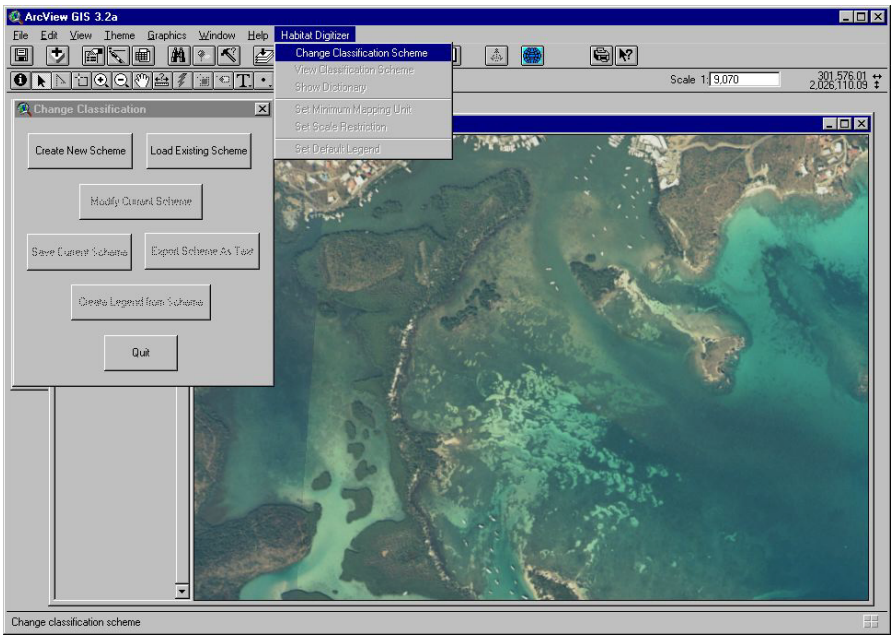

Figure 1. The Habitat Digitizer menu item initially only allows the user to create a new classification scheme or load an existing scheme.

Each hierarchical level in the scheme is represented by a separate field in the attribute table of a shapefile.

Adding Field Information

When creating a new classification scheme (Figure 1), the first step is the enter the field names and type (either string or numeric). In contrast to ArcView's 'Add Field' process, the field length and number of decimal places is not needed at this time. Once all the categories and subcategories of the scheme are entered, the lengths and precision will be automatically calculated.

Entering the Scheme

After the fields have been added, the extension brings up a dialog box (Figure 2) used to add the attributes of the scheme. This dialog allows a user to add categories and subcategories to a new scheme or make modifications to an existing scheme. Each unique attribute (e.g., Submerged Vegetation/Seagrass/Patchy/10-30%) is represented by a unique ID, which can either be assigned by the user or automatically assigned by the extension. After this process is complete, the scheme can be saved to an external file that can be loaded later or exported as a text file. Additionally, a legend showing all the unique attributes can be automatically generated.

User Defined Digitizing Restrictions

It may be desirable to set limitations on how features are digitized. Poor image resolution may preclude the interpretation of features smaller than some minimum size threshold. When a Minimum Mapping Unit (MMU) is set, a warning message will appear if a polygon is digitized that is smaller than the MMU. Also, all feature delineations may need to be conducted at the same scale, so that all polygons have

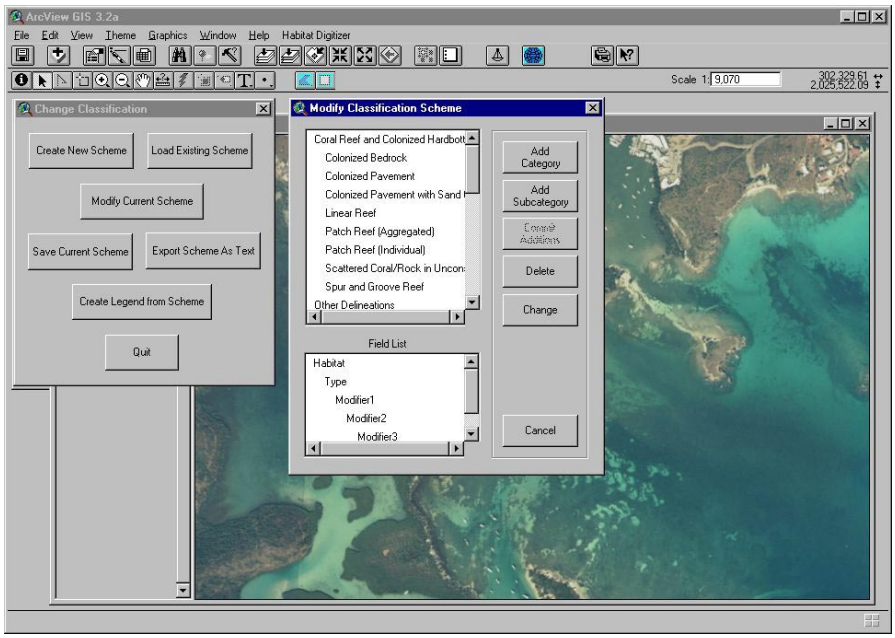

Figure 2. The active dialog box is used to create and modify the classification scheme, simultaneously showing the hierarchical fields structure of the scheme.

the same level of detail. The Scale Restriction menu choice will permit the user to digitize polygons only at the designated scale.

Creating a New Shapefile

With the push of a button, the extension will create a new shapefile and add all of the fields for the classification scheme into the attribute table. A user can specify a default legend that will be loaded for all subsequent shapefiles with this scheme.

Digitizing Tools

The extension contains several digitizing tools, each built upon the existing ArcView polygon tools. The 'Add New Polygon', 'Append Polygon', and 'Split Polygon' tools work the same way as the original ArcView tools, but with added functionality. After digitizing a polygon with the 'Add New' or 'Append' tool, a dialog box pops up to allow the user to select the attributes for the polygon (Figure 3). If the polygon added is below the MMU, a warning box will ask whether the user wants to add the polygon to the shapefile.

Additional Tools

Other menu tools in the extension include a button to increase the precision of the cursor position display and a button that places a box showing the current MMU. Several tools have been added to the pop-up menu, allowing the user to pan to a specific location, show the attributes of a selected polygon, change the attributes of selected polygons (using the dialog box), and show the area of the selected polygon. The pop-up menu also contains a tool to show an MMU box while digitizing a polygon, something the menu MMU tool cannot do.

More Information

The Habitat Digitizing Extension runs on Arcview 3.1 or higher. Additional memory may be required when using large images. The Image Analyst extension is helpful in making fine adjustments to the display of the imagery but is not required.

This extension can be downloaded at http://biogeo.nos.noaa.gov/products/apps/digitizer. The zip file contains the extension, a help document, a sample classification scheme and a sample legend.

For more information on the Habitat Digitizing Extension or NOAA's other habitat and biogeography projects, contact Ken Buja (301-713-3028 x140 or Ken.Buja@noaa.gov) or Mark Monaco, Chief, NOAA's Biogeography Program (301-713-3028 x160 or Mark.Monaco@noaa.gov), or visit NOAA's Biogeography Program web site at http://biogeo.nos.noaa.gov.

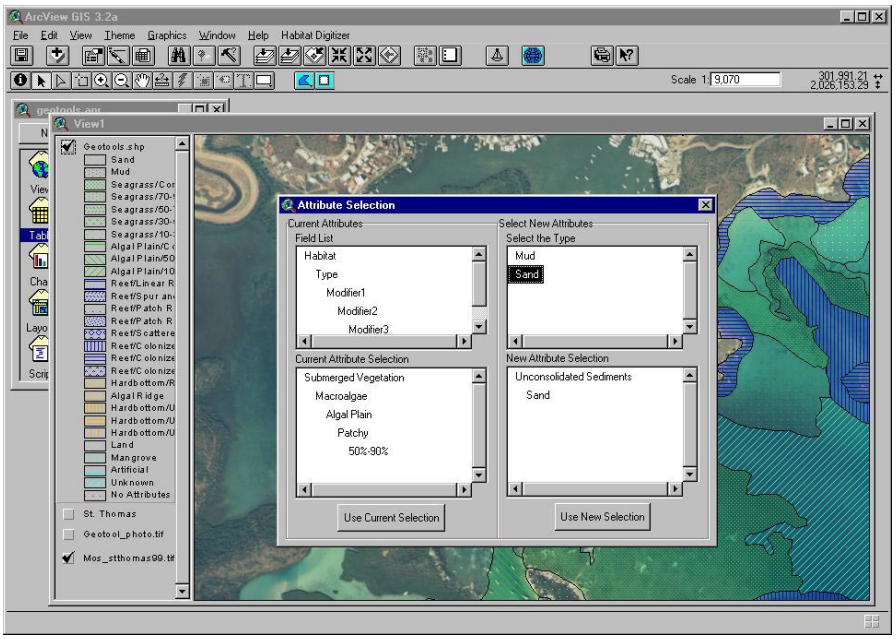

Figure 3. The attribute selection dialog box shows the hierarchical structure of the classfication scheme, allowing an easy selection of a habitat type.